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4. A COLORING MATTER FOUND IN SOME BORRAGINACEAE.

BY J. B. S. NORTON.

Some time last summer Mr. J. G. Smith, of the Division of Agrostology, sent a small specimen from Grant Co., New Mexico, to the Missouri Botanical Garden for identification, which I decided to be *Plagiobothrys Arizonicus* Greene. Mr. Metcalfe, who collected the plant, says that "when the sheep find a patch of it, it colors their heads red clear to their ears." The herbage of the dried plant had stained the letter which unclosed it a violet purple, something like wine stains. Mr. A. M. Ferguson tells me that a plant of western Texas, doubtless also some species of *Borraginaceae*, is known to affect sheep in a similar manner. The New Mexican plant is known there as blood purslane, says Mr. Smith in a recent letter, and is fine for sheep pasture in the spring.

These facts prompted me to further investigate the matter. I examined the other specimens of the same species and others of that genus and related genera in the Garden herbarium and found that a number of specimens had stained the paper in the same way, some through as many as five herbarium sheets. The color spreads through the paper from the mounted plant, though in what manner I have not been able to ascertain.

It is well known that a coloring matter is common in the roots of several species of *Borraginaceae* and the substance is probably the same in all. It is known as alkannin, and is a non-nitrogenous, resinous, purple coloring matter, soluble in oils, alcohol and ether but not soluble in water.* alkannin or alkanet (or alcanet), as the dye is called, is

* The information regarding the properties and uses of alkannin is taken from Tschirch, *Angewandte Pflanzenanatomie*, The United States Dispensatory, and The Century Dictionary.

obtained from the root bark of *Alkanna tinctoria* which is cultivated in South and Central Europe for the dye which is used in pharmacy for coloring salves, and for coloring wine and other liquids sold as wine. Alkanet is also an excellent test for resins and oils, to which it gives a red color, and is used in microchemistry as a reagent for these substances. The dye is said to give a brilliant violet color with iron and alum mordants to linen, cotton and silk, but not to wool. The fact that the wool on sheep grazing among growing plants is colored is probably due to the alkannin being dissolved in the oil of the wool. In the old world alkannin occurs also in quantity of commercial value in *Arnebia*, *Echium*, *Symphytum*, *Onosma* and *Lithospermum*.*

In a brief examination I have found but a few references to this color in American *Borraginaceae*. The color in the roots of species of *Lithospermum* (the puccoon of the Indians) is well known; and Dr. Gray in the Synoptical Flora, mentioned one species of *Plagiobothrys* (*P. Torreyi*), the herbage of which "gives an abundant violet stain to paper." It is opposed in this character to *P. ursinus* of similar habit, but "imparting no violet stain to paper." *P. tinctorius* (Ruiz & Pavon) Gray, Proc. Am. Acad. 20: 283, of South America, is also described as "papyros violaceo colore tingens."

An examination of the herbarium material of the Garden shows that the coloring matter is abundant enough to stain the herbarium paper in the following species, chiefly in the roots: *Echium vulgare*, *Eritrichium glomeratum*, *Krynitzkia barbiger* (abundant in leaves), *K. Californica* (slight), *K. maritima*, *K. micrantha*, *K. pterocarya*, *Lithospermum multiflorum*, *L. strictum*, *L. spathulatum*, *L. hirtum*, *L. canescens*, *L. angustifolium* (not abundant), *Plagiobothrys canescens* (in leaves), *P. nothofulvus* (in leaves), *P. tenellus*, *P. Arizonicus* (abundant in stem and

* Engler & Prantl, Pflanzenfamilien 4^{sa}: 73, 113, 124, 127.

leaves as well as root), *P. Torreyi* (very abundant in some specimens, others with hardly a trace).

The coloring matter in the American plants seems to be the same as that derived from *Alkanna tinctoria*. Though I know of no analysis of any of the American *Borraginaceae*, Professor Pammel and myself have obtained the characteristic reactions from the leaves and roots of *Plagiobothrys* with resin and oils. The color is also very persistent on the hands after handling the plants. Perhaps some economical use may be made of our American plants.

5. NOTES ON SOME PLANTS, CHIEFLY FROM THE SOUTHERN UNITED STATES.

BY J. B. S. NORTON.

The following notes and descriptions are based principally upon an examination of several collections from the Southern States, which have been acquired by the Missouri Botanical Garden during the past year, with the addition of a few others from scattering collections which I deemed especially noteworthy. The larger collections are: (1) The herbarium of the late Dr. Joseph F. Joor, of New Orleans, La., containing a few thousand plants, mostly his own collections in southern Louisiana and Mississippi, and in eastern Texas, a region not well known botanically. The collection is especially rich in grasses and grass-like plants, none of which I have included here, these notes being mainly on such plants as seemed noteworthy in preparing the plants for the herbarium. A further examination of the collection will no doubt reveal many things of interest concerning the botany of the South. (2) The herbarium of Gustave Jermy, of San Antonio, Texas, which contains practically a complete representation of the flora of Gillespie Co., Tex. A large part of these have been noted in Coulter's Botany of Western

Texas as, "reported from Gillespie Co.," "Jermy," etc. I have made but little mention of these here as I believe that a further examination of this interesting collection may justify the publication of a complete list. (3) A collection of about 200 plants from San Antonio, Tex., which were recently sent to the Garden for identification by Mr. E. H. Wilkinson. (4) Collections made in various parts of southern Texas by Dr. Trelease during the spring and autumn of 1897.

CEBATHA CAROLINA (L.) Britton.

A desert form of this usually climbing species collected at San Antonio, Texas, by Wilkinson, has short ascending branches only 15-20 cm. high with leaves thicker than usual.

SARRACENIA FLAVA L.

Collected by Dr. Joor at Lakeland, in central Louisiana, which is probably the western limit of this species.

STIPULICIDA SETACEA Michx.

Collected on the Mississippi Gulf coast at Long Beach, by Dr. Joor. This has not to my knowledge been before reported west of Florida. The specimen is a poor one and may be Nash's *S. filiformis* if the two species are distinct.

HIBISCUS LASIOCARPOS Cav.?

Stem slightly pubescent; upper leaves ovate lanceolate, subcordate, acuminate, dentate-serrate, glabrous above; petioles adherent to the pedicels; bracts somewhat ciliate hairy; calyx lobes acuminate, prominently nerved; petals distinctly yellow in dried specimens; young capsules with a few short hairs.

The above description characterizes two plants collected by Dr. Joor in Louisiana, one on the lake shore at West End near New Orleans, 1890; the other on the Sabine river opposite Orange, Texas, in 1884. This may be *H. incanus* Wendl., which is listed from Louisiana, in Riddell's Catalogus Florae Ludovicianaë, but in the Synoptical Flora is

given only west to Alabama; but seems to me nearer *H. lasiocarpus* of which other dried specimens show the yellow color ascribed to *H. incanus* though not so pronounced as in the Joor specimens. Nash's no. 673 from Florida in the Garden herbarium labeled *H. incanus* has very hirsute capsules and in that and other characters comes near to *H. lasiocarpus*, but the pubescence is more like that of *H. Moscheutos* and *incanus*. It seems evident that more study of this section of *Hibiscus* will be necessary to separate well the species composing it.

KALLSTROEMIA PARVIFLORA n. sp.

Primary branches a foot or two long, covered with long spreading hairs or glabrate below; leaves short petioled, with 3-4 pair of leaflets; leaflets 6-12 mm. long, oblong, usually acute, with appressed pubescence; pedicels 15-20 mm. long, longer than the leaves; sepals linear-lanceolate, persistent, in fruit longer than the carpels; petals light yellow, 6-8 mm. long; fruit minutely appressed pubescent, splitting into 8-10 nutlets, short tuberculate on the back; the persistent style 5-8 mm. long, longer than the carpels.—Collected at Agricultural College, Miss., by Pollard, Aug., 1896, no. 1295, and at San Antonio, Texas, by E. H. Wilkinson, 1897, no. 184.—Plate 46.

Nearest *K. grandiflora* of the Southwest United States, but differs from that species in the smaller leaves with fewer leaflets, and smaller flowers. Said by Mr. Wilkinson to be common at San Antonio.

JUSSIAEA OCTONERVIA Lam.

Among the Wilkinson plants from San Antonio, Tex.; also collected at New Braunfels by Lindheimer, but not given in Coulter's Botany of Western Texas.

MEGAPTERIUM OKLAHOMENSE n. sp.

Stems decumbent or ascending, branches $1\frac{1}{2}$ -3 dm. long, whole plant glabrous even when young; leaves coriaceous, lanceolate, with remote teeth in the thickened margin, or

sometimes entire, 6–9 cm. long, attenuate to a long petiole; calyx tube 8–9 cm. long, the lobes purple spotted, tips free and slender; flowers 4–5 cm. in diameter; capsules oblong, about 3 cm. long, wings less than 1 cm. wide, short pedicelled; seeds crested but scarcely tuberculate. — Specimens examined: Waugh, Marena, Oklahoma, 1893, No. 183; Hitchcock, Barber Co., Kan., 1895, No. 165a. — Plate 47. f. 1–3.

Differs from *M. Missouriense* (Sims) Spach, in the absence of all pubescence, the smaller flowers and fruit, the latter oblong and more tapering at the apex, and the thick more dentate leaves with a thick marginal line.

MEGAPTERIUM FREMONTII (S. Wats.) Britton.

Watson describes the seed as “not crested nor tuberculate.” In specimens from Kansas (Hitchcock, no. 165) the seeds are prominently crested and also somewhat tuberculate. — Plate 47. f. 4.

MEGAPTERIUM MISSOURIENSE (Sims) Spach.

There seems to be a marked difference in the seeds of different forms of this species, but I have not had opportunity to examine enough material to see whether the characters remain constant for the different forms or not. The seeds of the narrow-leaved Texan forms (var. A, Gray, Boston Jour. Nat. Hist. 6: 188) are light colored and have a crest sometimes 2 mm. broad with dentate or entire margin and extending almost the entire length of the seed. The seeds of the form common further north are smaller, darker colored and have a lacinate or lobed crest extending about half the length of the seed. — Plate 47. f. 5–6.

LILAEOPSIS CAROLINENSE Coulter and Rose.

In the Joor herbarium is a specimen of this species recently described from plants collected on the Atlantic coast. The plant bears the following label in Dr. Joor's handwriting: “*Crantzia*, n. sp.? Peduncles less than $\frac{1}{4}$ length of lvs. Lvs. flat, with distinct lamina. Fls. pinkish.

Louisiana Av. Swamp May 8, 1889. Joor.” About one-half the fruits examined have an additional oil tube and rudimentary rib on one side next the commissure. I have also referred to this species another plant collected in the same locality by A. B. Langlois, May, 1880. This plant is more slender and has much longer peduncles.— Plate 48.

LOBELIA CARDINALIS L.

In July, 1897, I noticed this species flowering in the bog in the Garden, and it seemed to me, much earlier than I had seen it in flower in Kansas the year before. An examination of the herbarium showed the following time of first flower, as nearly as could be ascertained from dried specimens and the dates of collection: Average of 7 plants east of the Mississippi river, Aug. 6; average of 5 Missouri plants, Aug. 24; average of 5 Kansas and Indian Territory plants, Sept. 5; average of 4 Texas plants, Sept. 12; one Mexican specimen of *L. splendens*, Oct. 15.

The western specimens form a transition from *L. cardinalis* of the East United States to *L. splendens* of the Southwest. The leaves are larger and narrower than the eastern form, more glabrous and less serrate, but I think it hardly deserves a varietal name.

EUPHORBIA COROLLATA JOORII n. var.

Plant 10–14 cm. high, branching from the base, glabrous or pubescent; leaves ovate; involucre long pedicelled (10–25 mm.), appendages of the glands unequal in size, one or two shorter than the rest, sometimes narrower than the gland.— Plate 49.

The collections of Dr. Joor in eastern Texas furnish this variety of this polymorphous species. The plants are from Milano, Texas. Most of them are glabrous or nearly so, but one, otherwise similar, is very pubescent with long hairs.

EUPHORBIA EXSTIPULATA Engelm.

This species, hitherto known only from Arizona, New Mexico, and western Texas, is represented in Wyoming by

Nelson's number 549, distributed as *E. dentata*. This species very much resembles small, narrow-leafed forms of *E. dentata*, in habit. Especially do those with wider ovate or oblanceolate leaves, of which the following are examples: Pringle, Arizona, 1884; Rusby, N. Mex., 1880, no. 379; Miss Mulford, New Mex., 1895. The figure in Boissier's *Icones Euphorbiarum*, probably from Wright's specimen, represents the narrow-leafed smoother form.

ACALYPHA LINDHEIMERI Muell.

The species has been described as having the leaves acute at the base. All the specimens I have seen from the United States have the base, except in the upper leaves, obtuse, and in many subcordate. Specimens collected by Wilkinson at San Antonio, Tex., lack the spreading pubescence on the stem.

SAGITTARIA ARIFOLIA AQUATILIS, J. G. Smith in herb.

Aquatic; leaves floating, petioles slender, 2-6 dm. long, leaf blade narrow, basal lobes usually curved inward; phyllodia long linear; fertile pedicels mostly 1 cm. long; stamens somewhat thickened at the base; mature achenes not seen.—Specimens examined from Lake Pend d'Oreille, Idaho, collected by Leiberg, 1891, no. 526, also by Henderson, same locality, 1897, no. 2977, "in water 6-12 inches deep." It may be that the specimen collected by Davis, Alma, Mich., 1890, with broad linear lanceolate phyllodia belongs here.—Plate 50.

Perhaps a distinct species but seems to be connected with typical *S. arifolia* by some of the Leiberg specimens of which there is a full series from water a few inches to several feet deep. The characters of the variety as given above slightly amplify the description of the species as published in Mr. Smith's monograph of the genus.

EXPLANATION OF PLATES.

The figures were drawn by Miss Grace E. Johnson from specimens in the herbarium of the Missouri Botanical Garden, or, in case of the details, from the author's sketches.

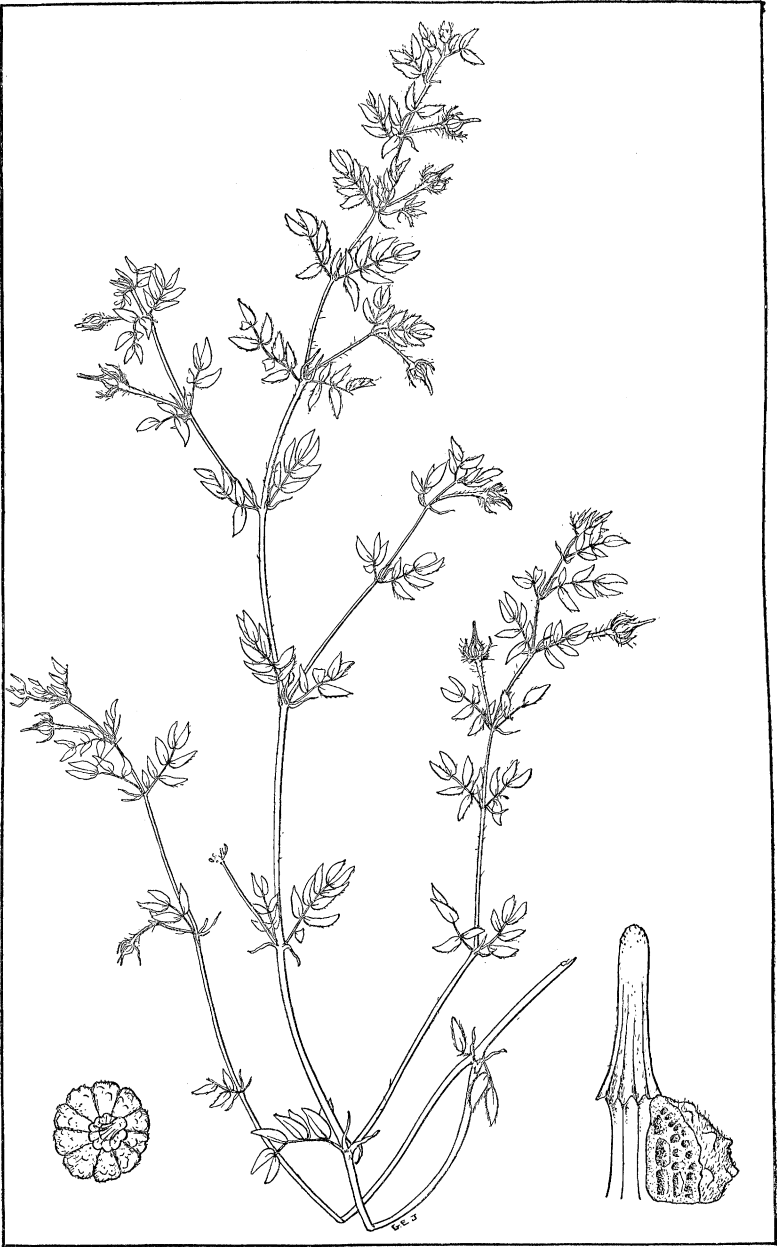
Plate 46. *Kallstroemia parviflora*.— Branch, one-half size; fruit, from above, $\times 2\frac{1}{2}$; carpel and style, from side, $\times 5$.

Plate 47. *Megapterium Oklahomense*.— 1, Plant, one-half size; 2, fruit, natural size; 3, seed, $\times 8$. *Megapterium Fremontii*.— 4, Seed, $\times 8$. *Megapterium Missouriense*.— 5, Seed of common form, $\times 8$; 6, seed of Texan form, $\times 8$.

Plate 48. *Lilaeopsis Carolinensis*.— 1, Portion of Joor plant, natural size; 2, portion of Langlois plant, natural size; 3, fruit, $\times 8$; 4, flowering umbel, $\times 5$.

Plate 49. *Euphorbia corollata Joorii*.— Plant, natural size; seed, $\times 8$; involucre and capsule, $\times 5$.

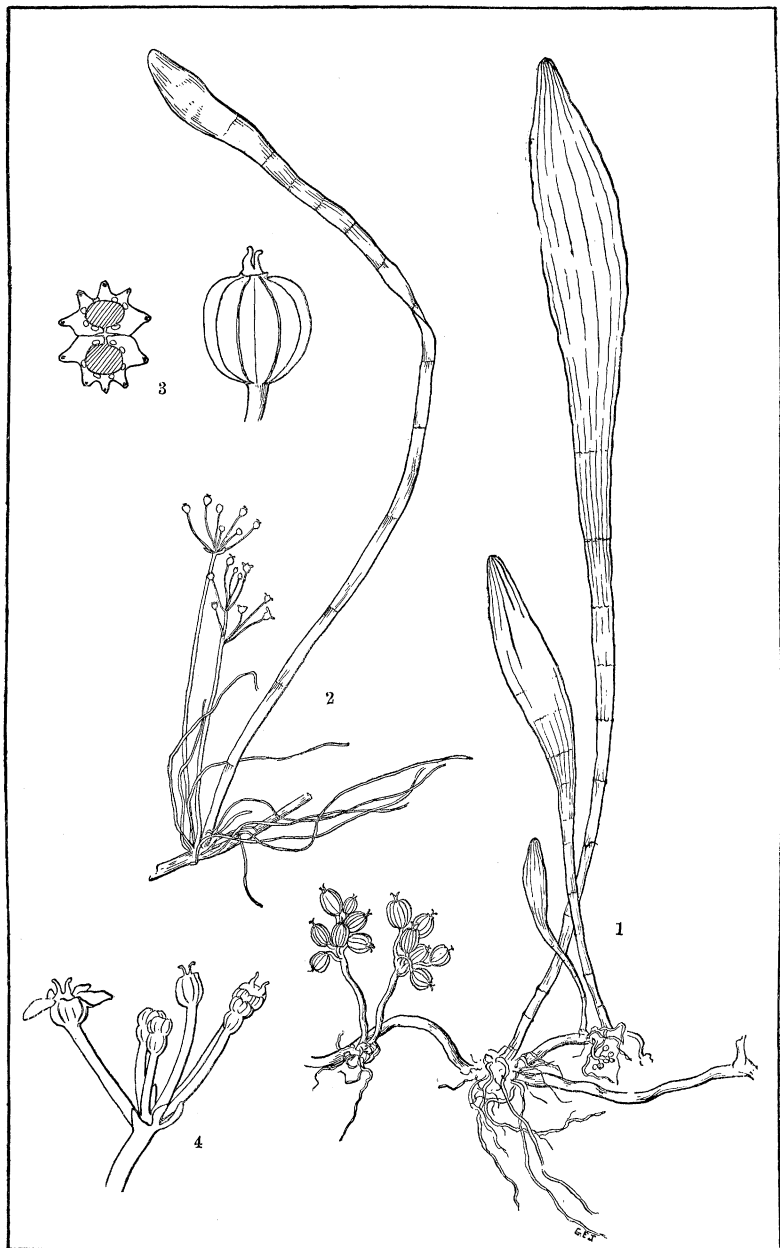
Plate 50. *Sagittaria arifolia aquatilis*.— Plant, one-half size; stamens and immature achenes, $\times 8$.



KALLSTROEMIA PARVIFLORA.



MEGAPTERIUM.



LILAEOPSIS.



EUPHORBIA COROLLATA JOORII.



SAGITTARIA ARIFOLIA AQUATILIS.